In the Claims

For the convenience of the Examiner, all claims are set forth below, whether or not an amendment has been made and whether or not newly added.

Please add the following new claims:

~~120.~~ A method of amplifying optical signals, comprising:

dividing a multiple wavelength optical signal at a specified wavelength into a first beam comprising a wavelength less than the specified wavelength and a second beam comprising a wavelength greater than the specified wavelength;

directing the first beam to a nonlinear polarization amplifier stage;

selecting at least a wavelength or an intensity of a pump wavelength driving the nonlinear polarization amplifier stage;

directing the second beam to a second amplifier stage; and

combining the first and second beams to produce an amplified multiple wavelength signal, wherein the wavelength or intensity of the pump wavelength is selected to affect the shape of a gain curve associated with the nonlinear polarization amplifier stage.

~~121.~~ The method of Claim 120, wherein the second amplifier stage comprises a rare earth doped amplifier stage.

~~122.~~ The method of Claim 120, wherein the nonlinear polarization amplifier stage comprises a Raman amplifier stage.

~~123.~~ The method of Claim 120, wherein a majority of the wavelengths of the multiple wavelength optical signal comprise wavelengths between 1430 and 1620 nanometers.

~~124.~~ The method of Claim 120, wherein the pump wavelength comprises a multiple wavelength pump signal comprising a plurality of pump wavelengths.

110

125. The method of Claim 124, wherein the plurality of pump wavelengths contribute to a pump spectrum comprising a plurality of peaks.

111

126. The method of Claim 125, wherein the plurality of peaks comprise at least three (3) peaks.

112

127. The method of Claim 125, wherein the plurality of peaks comprise at least four (4) peaks.

113

128. The method of Claim 125, wherein the at least two of the plurality of peaks are separated by a line width of at least one of the peaks at one half power of that peak.

114

129. The method of Claim 125, wherein at least two of the peaks comprise different amplitudes.

115

130. The method of Claim 125, wherein each of the peaks comprises an amplitude within ten (10) decibels of each of the other of the plurality of peaks.

116

131. The method of Claim 125, wherein each peak resides at a different center wavelength.

117

132. The method of Claim 125, wherein each of the plurality of peaks is spaced from all adjacent peaks by a substantially uniform wavelength spacing.

118

133. The method of Claim 125, wherein a wavelength spacing between a first pair of adjacent peaks of the plurality of peaks is different than a wavelength spacing between a second pair of adjacent peaks of the plurality of peaks.

119

134. The method of Claim 124, wherein selecting at least one wavelength or intensity of the pump wavelength comprises selecting a wavelength of the pump wavelength to result in a desired gain curve shape for the multiple wavelength signal.

B1

135. The method of Claim 134, wherein selecting a wavelength of the pump wavelength comprises selectively passing one pump wavelength from a plurality of pump wavelengths received.

136. The method of Claim 124, wherein selecting at least one wavelength or intensity of the pump wavelength comprises controlling a drive current to a light source generating the pump wavelength to control the intensity of the pump wavelength.

137. The method of Claim 120, further comprising:

producing a pump beam; and

directing the pump beam to a bandwidth adding mirror to generate a broadband pump spectrum;

wherein the pump wavelength comprises at least a portion of the broadband pump spectrum.

138. The method of Claim 1, wherein the nonlinear polarization comprises Raman amplification.

139. The method of Claim 120, wherein the nonlinear polarization comprises self-phase modulation.

140. The method of Claim 120, wherein the nonlinear polarization comprises four-wave mixing.

141. The method of Claim 120, wherein the gain medium comprises an optical fiber.

142. The method of Claim 120, further comprising applying a gain flattening element to the multiple wavelength optical signal to reduce variations in amplitude as a function of wavelength in the multiple wavelength optical signal.

128
143. A broadband amplifier, comprising:

a splitter coupled to an optical transmission fiber and operable to separate a multiple wavelength input signal into a first signal portion and a second signal portion;

a first amplifier coupled to the splitter and operable to receive the first signal portion;

a second amplifier coupled to the splitter and operable to receive the second signal portion; and

a coupler operable to receive the first and second signal portions from the first and second amplifiers and to combine the first and second signal portions into a multiple wavelength output signal;

wherein the first amplifier comprises:

a pump assembly operable to generate at least one pump wavelength for introduction to a Raman gain medium of the first amplifier, wherein at least a wavelength or an intensity of the at least one pump wavelength is manipulated to affect the shape of a Raman gain curve associated with the first signal portion in the first amplifier.

129
144. The broadband amplifier of Claim 143, wherein the pump assembly operates to generate a plurality of pump wavelengths.

130
145. The broadband amplifier of Claim 144, wherein the wavelengths or the intensities of at least some of the plurality of pump wavelengths are manipulated to affect the shape of the gain curve associated with the multiple wavelength optical signal in the amplifier stage.

131
146. The broadband amplifier of Claim 144, further comprising a controller operable to select one or more of the plurality of pump wavelengths for application to the gain medium.

132
147. The broadband amplifier of Claim 144, further comprising a controller operable to affect the intensity of one or more of the plurality of pump wavelengths to be applied to the gain medium.

148. The broadband amplifier of Claim 144, wherein the pump assembly comprises an array of laser diodes.

149. The broadband amplifier of Claim 144, wherein the plurality of pump wavelengths contribute to a pump spectrum comprising a plurality of peaks.

150. The broadband amplifier of Claim 149, wherein the at least two of the plurality of peaks are separated by a line width of at least one of the peaks at one half power of that peak.

151. The broadband amplifier of Claim 149, wherein at least two of the peaks comprise different amplitudes.

152. The broadband amplifier of Claim 149, wherein each of the peaks comprises an amplitude within ten (10) decibels of each of the other of the plurality of peaks.

153. The broadband amplifier of Claim 149, wherein each peak resides at a different center wavelength.

154. The broadband amplifier of Claim 149, wherein each of the plurality of peaks is spaced from all adjacent peaks by a substantially uniform wavelength spacing.

155. The broadband amplifier of Claim 149, wherein a wavelength spacing between a first pair of adjacent peaks of the plurality of peaks is different than a wavelength spacing between a second pair of adjacent peaks of the plurality of peaks.

156. The broadband amplifier of Claim 143, wherein the second amplifier comprises a rare earth doped amplifier.

157. The broadband amplifier of Claim 143, wherein the second amplifier comprises a Raman amplifier.

158. The broadband amplifier of Claim 143, further comprising a gain flattening element operable to reduce variations in amplitude as a function of wavelength of at least the first signal portion output from the first amplifier.--